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August 31, 2016

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road
P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon**:**

Re: Newfoundland and Labrador Hydro – 2017 Capital Budget Application – Project "Overhaul Turbine/Generators - Bay d'Espoir and Cat Arm" (Volume I, D-31).

Newfoundland and Labrador Hydro (Hydro) writes in relation to its 2017 Capital Budget Application, in particular, the proposed 2017 project "Overhaul Turbine/Generators - Bay d'Espoir and Cat Arm" (Volume I, D-31).

As part of its 2017 Capital Budget Application, Hydro proposed the project "Overhaul Turbine/Generators - Bay d'Espoir and Cat Arm" (Volume I, D-31). As noted in footnote 1 on page D-31, the work contained in this proposal for Bay d'Espoir (BDE) Unit 4 was planned prior to the 2016 supplemental capital project "Turbine Rehabilitation BDE Unit 4", approved in order P.U. 28(2016). In addition to completing the advanced refurbishment work described in the supplemental, by virtue of the dismantling, cleaning and reassembling of Unit 4, a significant portion of the work contained in this 2017 proposal for that unit was expected to be captured in the 2016 work. As noted by Hydro, this work is not additional scope to the supplemental plan, but work that is achieved through the completion of the 2016 work. At the time of submitting the 2017 capital proposal, Hydro was optimistic that the BDE Unit 4 2017 project would not have to proceed, but was unable to confirm until the 2016 project was further progressed.

Hydro is pleased to advise that the 2016 capital overhaul work on BDE Unit 4 has been completed and is in the reassembly stage. Hydro can now confirm that the work that was contained in the 2017 Capital Budget "Overhaul Turbine/Generators" for BDE Unit 4 is no longer required in 2017.

This project also included the overhaul of Cat Arm Unit 1 and this plan remains unchanged. In the original proposal, Hydro was seeking approval of $476,200 in 2017 to overhaul both units. The removal of BDE Unit 4 from the project results in Hydro seeking a forecasted 2017 expenditure of $305,400 for the project at Cat Arm only. The revised project description, attached, provides additional detail on the overhaul of the water jets on the turbine at Cat Arm Unit 1 for clarification.

Hydro respectfully withdraws the BDE component of the 2017 project "Overhaul Turbine/Generators - Bay d'Espoir and Cat Arm" from the 2017 Capital Budget Application. The revised project estimate table is below.

Table 1: Budget Estimate

Project Cost: *($ x1,000)*	**2017**	**2018**	**Beyond**	**Total**
Material Supply	46	0.0	0.0	46
Labour	135.9	0.0	0.0	135.9
Consultant	0.0	0.0	0.0	0.0
Contract Work	0.0	0.0	0.0	0.0
Other Direct Costs	60.1	0.0	0.0	60.1
Interest and Escalation	15	0.0	0.0	15
Contingency	48.4	0.0	0.0	48.4
TOTAL	**305.4**	**0.0**	**0.0**	**305.4**

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Tracey L. Pennell
Senior Counsel, Regulatory

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Thomas Johnson, QC – Consumer Advocate
Dean Porter, Poole Althouse

Project Title: Overhaul Turbine/Generator

Location: Cat Arm

Category: Generation - Hydraulic

Type: Other

Classification: Normal

Project Description:

This project is required to partially dismantle and reassemble Cat Arm Unit 1 turbine/generator to inspect, test, clean, repair and replace defective components. This overhaul involves cleaning and inspection of rotor and stator assembly, electrical testing on rotor/stator assembly, calibration and testing of turbine and generator protection devices, verification of bearing and seal clearances and a thorough inspection of turbine, water jets, and draft tube. Overhaul work on the water jets for the Pelton turbine, and generator bearing oil cooler replacement will also be completed on the generating unit during the outage.

The budget estimate for the project is shown in Table 1.

Table 1: Budget Estimate

Project Cost:*($ x1,000)*	**2017**	**2018**	**Beyond**	**Total**
Material Supply	46	0.0	0.0	46
Labour	135.9	0.0	0.0	135.9
Consultant	0.0	0.0	0.0	0.0
Contract Work	0.0	0.0	0.0	0.0
Other Direct Costs	60.1	0.0	0.0	60.1
Interest and Escalation	15	0.0	0.0	15
Contingency	48.4	0.0	0.0	48.4
TOTAL	**305.4**	**0.0**	**0.0**	**305.4**

Justification:

This large turbine/generator unit is required to operate efficiently and effectively, therefore regular overhauls and inspections are required. During the winter months this unit is required to be available nearly 100% of the time in order to meet the electricity demands of the Island Interconnected System. To achieve the winter readiness availability targets and annual system load requirements, this unit needs to have all major components inspected, tested and/or repaired on a six year frequency to minimize forced outages, forced de-ratings or unplanned maintenance outages, which could result in

customer interruptions. This frequency is based on the recommendations as outlined in Hydro's Asset Management Strategy (AMS) program. In addition, these inspections/overhauls are re-evaluated regularly by Hydro's Long Term Asset Planning team and maintenance groups to ensure they are efficient and effective.

It has been determined, during a previous inspection, that Cat Arm Unit 1 needs new generator bearing coolers. The existing coolers have previously been removed, refurbished, and reinstalled. Given their age and having corroded mild steel components that are in contact with water, their reliability level has been reduced. A failure of one of these generator coolers would allow bearing cooling water to enter the generator bearing oil sump and would result in an extended forced outage. The removed coolers will be refurbished (mild steel components replaced) for spares if their condition warrants. If the removed coolers cannot be refurbished then new coolers will have to be purchased as critical spares. These coolers are common to both units at Cat Arm.

An overhaul of water jets on the turbine at Cat Arm Unit 1 is also required. The water jets that direct water to the runner are hydraulically operated by the governor. These jets (six in total) are critical to the operation of the unit; they control the speed of the unit by adjusting the flow of water supplied to the runner. These jets are also used to stop the flow of water to shut down the unit as required. Since this equipment is located over a body of water and is hydraulically operated, maintenance is critical to ensure that there is no accidental release of oil into the environment and to prevent water from entering the governor oil circuit.

Existing System:

Hydro's hydroelectric generating units at Bay d'Espoir, Upper Salmon, Hinds Lake, Cat Arm, Paradise River, Granite Canal, Snook's Arm and Venom's Bight, have a total installed capacity of 957 MW. The Cat Arm Plant has two generating units each with an output of 67 MW for a total plant capacity of 134 MW. The units at Cat Arm are the Pelton type (impulse turbine), having a bucket type runner with hydraulically operated water jets. All hydro electric generators, intakes, spillways, control structures and plant auxiliary equipment are inspected annually but major inspections/overhauls are conducted on a six year frequency.

Age of Equipment or System

- Cat Arm Unit 1 – 1985 (31 years)

Unit capacity

- Cat Arm Unit 1 – 67 MW

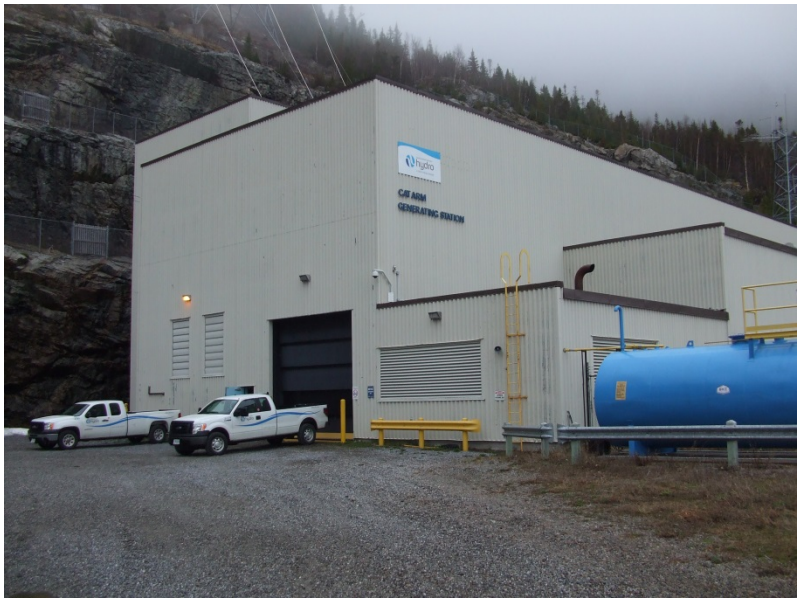

Figure 1: Cat Arm Hydro Generating Station

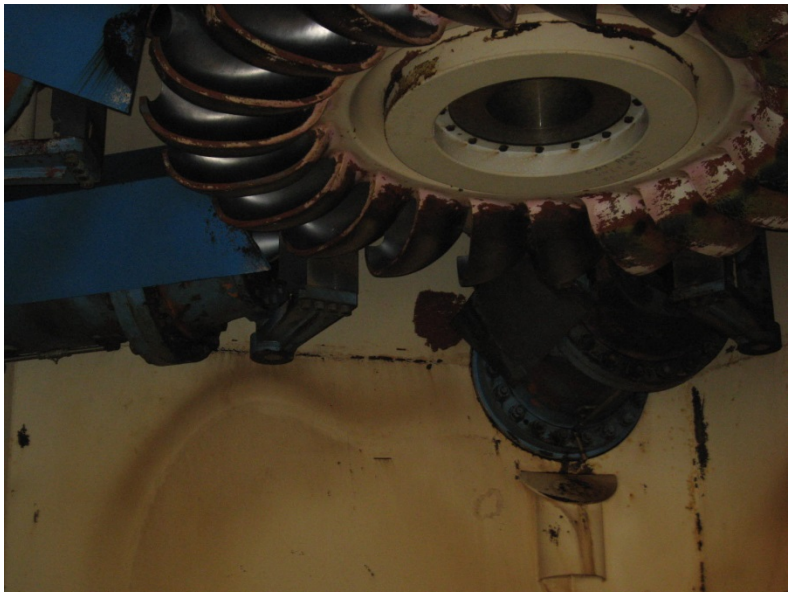

Figure 2: Cat Arm Pelton Turbine (Runner and jets)

Major Work/or Upgrades

Table 2 details the major upgrades on Cat Arm Unit 1 hydroelectric generator.

Table 2: Major Work or Upgrades – Cat Arm Unit 1

Year	Major Work/Upgrade	Comments
2011	Major Unit Overhaul completed	Preventive Maintenance
2009	Generator Oil Level System replacement	System replaced to provide better protection
2009	Turbine Bearing Oil Level System replaced	System replaced to provide better protection
2009	Tack Pak Speed Sensor installed	Used for secondary unit speed reference
2008	Spherical Valve Duplex Strainer replaced	Ensure water quality maintained
2008	Spherical Valve Seal Refurbishment	Maintenance Seal redesigned and replaced
2006	Governor Controls Replacement	Existing controls were obsolete
2002	Replaced Exciter with ABB Unitrol F	Existing exciter was obsolete – no parts
1999	Spherical Valve Seal Replacement	Replaced upstream and downstream seals

Operating Experience

Cat Arm Unit 1 turbine/generator unit is one of sixteen hydroelectric generating units that Hydro operates and maintains to meet Island system load requirements.

Carbon dust is created by the constant rotation of the excitation slip rings and brushes, and brake dust is also created when the unit is stopped. These sources of dust ultimately end up deposited in the rotor and stator. This dust has the potential of creating short circuits to ground (tracking) and has to be manually cleaned. A partial dismantle is required on all units to clean these components ensuring that this contamination does not create operational problems and reduce the reliability of the units.

Water jet oil leakage is monitored and trended on the units at Cat Arm. Information collected is reviewed prior to the major maintenance outage to help decide which jets will be overhauled. An engineering directive has been developed for guidance in making these decisions.

All turbine/generator units are given a major overhaul every six years as per the recommendations in the Asset Management Strategy which is based on operating and maintenance experience and the Original Equipment Manufacturer (OEM) recommendations.

Reliability Performance

Table 3 outlines the forced, maintenance and planned outages for the unit.

Table 3: Outage Statistics – Cat Arm Unit 1

Year	Forced Outages	Maintenance and Planned Outages	Total Outages
2015	2	2	4
2014	1	5	6
2013	1	3	4
2012	1	2	3
2011	3	3	6

Environmental Performance

There are no environmental performance issues with respect to the overhaul of these units. Any waste oil or scrap metal generated from these overhauls will be disposed of in a manner that conforms to Hydro's environmental policies.

Industry Experience

Work performed during major inspections and overhauls is based on operational experience and manufacturer recommendations. These inspections/overhauls are also based on best practices being utilized by other utilities.

Vendor Recommendations

Vendor maintenance recommendations were considered and applied where applicable when the major PM inspection programs were developed.

Maintenance or Support Arrangements

Maintenance of hydroelectric generators is conducted internally by Hydro personnel. Contractors and consultants are typically used to perform large, exceptional pieces of work where the skill sets are not available internally.

Maintenance History

The five-year maintenance history for Cat Arm Unit 1 is shown in Table 4.

Table 4: Five-Year Maintenance History Cat Arm Unit 1

Year	Preventive Maintenance ($000)	Corrective Maintenance ($000)	Total Maintenance ($ 000)
2015	37	51	88
2014	78	36	114
2013	45	25	70
2012	24	26	50
2011	90	63	153

Historical Information

The historical cost information for unit overhauls is recorded in Table 5.

Table 5: Hydraulic Unit Overhaul Capital Budget and Expenditures History

Year	Capital Budget ($000)	Actual Expenditures ($000)	Locations
2016	1,345.6	TBD	Bay d'Espoir Unit 6 and Unit 7
2015	304.4	325.8	Paradise River and Bay d'Espoir Unit 5
2014	485	481.2	Hinds Lake and Bay d'Espoir Unit 3
2013	428.1	214.4	Bay d'Espoir Unit 1 and Cat Arm Unit 2

Anticipated Useful Life

The useful life of the major overhaul of the turbine/generator unit is six years.

Development of Alternatives

All hydroelectric generators require regularly scheduled major overhauls. To ensure long term reliability of these assets, maintenance repairs and major overhauls have no viable alternative.

Conclusion:

Hydroelectric generators are required to operate in an efficient manner and are required to be available nearly 100% of the time in winter in order to meet system energy requirements on a daily basis. Major inspections and overhauls are essential to ensure continued safe, reliable and efficient operation of the Island Interconnected System.

Project Schedule:

Major inspections and overhauls are performed by Hydro personnel. The schedule varies between three and four weeks per unit however the actual outage schedule for each unit is not identified until December of the previous year based on operating experience of the year before.

The anticipated project schedule is shown in Table 6.

Table 6: Project Schedule

Activity		Start Date	End Date
Planning	Detailed Plan for the overhaul outage	January 2017	June 2017
Procurement	Specify material requirements	March 2017	September 2017
Construction	Perform the Major Inspection/Overhauls	May 2017	November 2017
Commissioning	Return the Units to Service	July 2017	November 2017
Closeout	Closeout the project	November 2017	December 2017